

UFO: “Unidentified” Floating Object Driven by Thermocapillarity

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Abstract

In this fluid dynamics video, we show thermocapillary actuation of a binary drop of water and heptanol where the binary drop in motion takes on a UFO-like shape. On a parylene-coated silicon surface subjected to a linear temperature gradient, a pure heptanol droplet quickly moves to the cold side by the Marangoni stress, while a pure water droplet remains stuck due to a large contact angle hysteresis. When the water droplet was encapsulated by a thin layer of heptanol and thermally actuated, the binary droplet takes on a peculiar shape resembling an UFO, i.e. an “unidentified” floating object as the mechanism is not yet completely understood. Our finding suggests that pure liquid droplets (e.g. aqueous solutions) that are not conducive to thermocapillary actuation can be made so by encapsulating them with another judiciously chosen liquid (e.g. heptanol).

1 Introduction

Video 1 includes all necessary information and videos.